

## AMENDMENTS TO THE CLAIMS

Please amend the claims as noted below, without prejudice to subsequent renewal. The listing of claims below replaces all prior versions, and listings, of claims in the application.

These amendments introduce no new matter and support for the amendment is replete throughout the specification and claims as originally filed. These amendments are made without prejudice and are not to be construed as abandonment or dedication of the previously claimed subject matter, or agreement with any objection or rejection of record.

### **Listing of Claims:**

**1-103.** (Canceled)

**104.** (Currently amended) A photovoltaic device, comprising:

- a first electrode layer;
- a second electrode layer; and

a first photoactive layer disposed between the first and second electrode layers, wherein the photoactive layer is disposed in at least partial electrical contact with the first electrode and with the second electrode, wherein the photoactive layer comprises a first population of discrete nanostructures and a small molecule, which small molecule is a semiconductive molecule other than a dye, [[and]] wherein the photoactive layer is free of conductive polymer, and wherein the photoactive layer is hermetically sealed.

**105.** (Previously presented) The photovoltaic device of claim **104**, wherein the nanostructures and the small molecule exhibit a type II band offset energy profile.

**106.** (Previously presented) The photovoltaic device of claim **104**, wherein the small molecule comprises an organic, nonpolymeric molecule.

**107.** (Previously presented) The photovoltaic device of claim **104**, wherein the small molecule has a molecular weight less than 3000, less than 2000, less than 1500, less than 1000, or less than 500.

**108.** (Previously presented) The photovoltaic device of claim **104**, wherein the small molecule conducts holes.

**109.** (Previously presented) The photovoltaic device of claim **104**, wherein the nanostructures are disposed in a matrix comprising the small molecule.

**110.** (Previously presented) The photovoltaic device of claim **104**, wherein the photoactive layer comprises at least two sublayers, wherein at least one of the sublayers comprises the nanostructures and at least one of the sublayers comprises the small molecule.

**111.** (Previously presented) The photovoltaic device of claim **104**, wherein the photoactive layer comprises the small molecule dispersed in a nonconductive polymer.

**112.** (Cancelled)

**113.** (Original) The photovoltaic device of claim **104**, wherein the nanostructures comprise nanocrystals.

**114.** (Original) The photovoltaic device of claim **104**, wherein the nanostructures comprise nanowires.

**115.** (Original) The photovoltaic device of claim **104**, wherein the nanostructures comprise: a single-crystal nanostructure, a double-crystal nanostructure, a polycrystalline nanostructure, or an amorphous nanostructure.

**116.** (Original) The photovoltaic device of claim **104**, wherein the nanostructures comprise at least a portion that is comprised of a semiconductor selected from the group consisting of: a Group II-VI semiconductor, a Group III-V semiconductor, a Group IV semiconductor, and an alloy thereof

**117.** (Original) The photovoltaic device of claim **104**, wherein the population of nanostructures comprises nanocrystals that comprise one or more of: CdSe, CdTe, InP, InAs, CdS, ZnS, ZnSe, ZnTe, HgTe, GaN, GaP, GaAs, GaSb, InSb, Si, Ge, AlAs, AlSb, PbSe, PbS, or PbTe.

**118.** (Original) The photovoltaic device of claim **104**, wherein the photoactive layer is disposed in at least partial electrical contact with the first electrode along a first plane and with the second electrode along a second plane.

**119.** (Original) The photovoltaic device of claim **118**, wherein the nanostructures of the first population each has at least one elongated section oriented predominantly normal to at least the first plane.

**120.** (Original) The photovoltaic device of claim **104**, wherein the nanostructures comprise branched nanocrystals having more than one elongated segment.

**121.** (Original) The photovoltaic device of claim **104**, further comprising a hole or electron blocking layer disposed between the photoactive layer and the first or second electrode.

**122.** (Original) The photovoltaic device of claim **104**, further comprising a hole blocking layer disposed between the photoactive layer and the first electrode and an electron blocking layer disposed between the photoactive layer and the second electrode.

**123.** (Original) The photovoltaic device of claim **104**, wherein at least one of the first and second electrodes are flexible.

**124.** (Original) The photovoltaic device of claim **123**, wherein the first and second electrodes and the photoactive layers are flexible.

**125.** (Original) The photovoltaic device of claim **104**, wherein at least one of the first and second electrodes comprises a transparent conductive layer.

**126.** (Original) The photovoltaic device of claim **104**, wherein at least one of the electrodes comprises aluminum.

**127.** (Canceled)

**128.** (Currently amended) The photovoltaic device of claim **104** ~~[[127]]~~, the device comprising at least one sealing layer in addition to the first and second electrodes.

**129.** (Currently amended) The photovoltaic device of claim **128**, wherein the device comprises at least first and second sealing layers in addition to the first and second electrodes, the photoactive layer and first and second electrodes being sandwiched between the first and second sealing layers, wherein the first and second sealing layers encompass the entire photoactive layer.

**130. (Original)** The photovoltaic device of claim **104**, wherein the overall device comprises a non-planar architecture.

**131. (Original)** The photovoltaic device of claim **104**, wherein the device comprises a convex architecture.

**132. (Original)** The photovoltaic device of claim **104**, wherein the first electrode layer, the photoactive layer and the second electrode layer are oriented in a coiled architecture.

**133. (Original)** The photovoltaic device of claim **104**, wherein the first electrode layer, the photoactive layer and the second electrode layer are oriented in a reciprocating stacked architecture.

**134. (Original)** The photovoltaic device of claim **104**, wherein the first population of nanostructures comprises at least two different nanocrystal subpopulations, each nanocrystal subpopulation having a different absorption spectrum.

**135. (Original)** The photovoltaic device of claim **134**, wherein the different nanocrystal subpopulations comprise different compositions.

**136. (Original)** The photovoltaic device of claim **134**, wherein the different nanocrystal subpopulations comprise nanocrystals having different size distributions.

**137. (Original)** The photovoltaic device of claim **104**, wherein the device comprises at least a second photoactive layer.

**138. (Original)** The photovoltaic device of claim **104**, further comprising:

a third electrode layer;

a fourth electrode layer; and,

a second photoactive layer disposed between the third and fourth electrode layers, wherein the second photoactive layer is disposed in at least partial electrical contact with the third electrode along a third plane and in at least partial electrical contact with the fourth electrode along a fourth plane, wherein the second photoactive layer comprises a second population of nanostructures having a different absorption spectrum from the first population of nanostructures, and wherein the third electrode layer, fourth electrode layer and

second photoactive layer are attached to, but electrically insulated from, the first electrode layer, second electrode layer and first photoactive layer.

**139. (Original)** The photovoltaic device of claim **104**, comprising:

- a third electrode layer; and,
- a second photoactive layer disposed between the second and third electrode layers, wherein the second photoactive layer is disposed in at least partial electrical contact with the second electrode and in at least partial electrical contact with the third electrode.

**140. (Original)** The photovoltaic device of claim **104**, comprising:

- a second photoactive layer; and,
- a first recombination material disposed between the first and second photoactive layers, wherein the first recombination material is in at least partial electrical contact with the first and second photoactive layers.

**141-285. (Cancelled)**

**286. (Withdrawn)** A photovoltaic device, comprising:

- a first electrode layer;
- a second electrode layer;
- a first photoactive layer disposed between the first and second electrode layers, wherein the photoactive layer is disposed in at least partial electrical contact with the first electrode and with the second electrode, wherein the photoactive layer comprises a first population of nanostructures and a conductive polymer whose charge carrying properties have been altered during fabrication of the device by controlled partial oxidation of the polymer;
- a second photoactive layer; and,
- a first recombination material disposed between the first and second photoactive layers, wherein the first recombination material is in at least partial electrical contact with the first and second photoactive layers.

**287. (Previously presented)** The photovoltaic device of claim **109**, wherein the matrix comprises the small molecule and a nonconductive polymer.

**288.** (Previously presented) The photovoltaic device of claim **287**, wherein the small molecule comprises greater than 50% of the matrix by weight.

**289.** (Previously presented) The photovoltaic device of claim **287**, wherein the small molecule comprises greater than 75% of the matrix by weight.

**290.** (Previously presented) The photovoltaic device of claim **287**, wherein the small molecule comprises greater than 90% of the matrix by weight.

**291.** (Previously presented) The photovoltaic device of claim **287**, wherein the small molecule comprises greater than 95% of the matrix by weight.

**292.** (Previously presented) The photovoltaic device of claim **109**, wherein the small molecule comprises 100% of the matrix by weight.

**293.** (Currently amended) A photovoltaic device, comprising:

a first electrode layer;

a second electrode layer; and

a first photoactive layer disposed between the first and second electrode layers, wherein the photoactive layer is disposed in at least partial electrical contact with the first electrode and with the second electrode, wherein the photoactive layer comprises a first population of discrete nanostructures and a small molecule, which small molecule is *N,N'*-diphenyl-*N,N'*-bis-(3-methylphenyl)-(1,1'-diphenyl)-4,4'-diamine (TPD), *N,N'*-diphenyl-*N,N'*-bis(1-naphthyl)-1,1'-biphenyl-4,4'-diamine ( $\alpha$ -NPD), or *N,N'*-biphenyl-*N,N'*-bis-(1-naphenyl)-[1,1'-biphenyl]-4,4'-diamine (NPB), [[and]] wherein the photoactive layer is free of conductive polymer, and wherein the photoactive layer is hermetically sealed.

**294.** (Previously presented) The photovoltaic device of claim **293**, wherein the nanostructures are disposed in a matrix comprising the small molecule.

**295.** (Previously presented) The photovoltaic device of claim **294**, wherein the matrix comprises the small molecule and a nonconductive polymer.

**296.** (Previously presented) The photovoltaic device of claim **295**, wherein the small molecule comprises greater than 50% of the matrix by weight.

**297.** (Previously presented) The photovoltaic device of claim **295**, wherein the small molecule comprises greater than 75% of the matrix by weight.

**298.** (Previously presented) The photovoltaic device of claim **295**, wherein the small molecule comprises greater than 90% of the matrix by weight.

**299.** (Previously presented) The photovoltaic device of claim **295**, wherein the small molecule comprises greater than 95% of the matrix by weight.

**300.** (Previously presented) The photovoltaic device of claim **294**, wherein the small molecule comprises 100% of the matrix by weight.

**301.** (New) The photovoltaic device of claim **104**, wherein the first or second electrode layer comprises an aluminized polymer film.

**302.** (New) The photovoltaic device of claim **104**, wherein the first and second electrode layers each comprise a conductive portion disposed in at least partial electrical contact with the first photoactive layer and a nonconductive portion surrounding the conductive portion, which nonconductive portion seals against the corresponding nonconductive portion of the opposing electrode layer, thereby hermetically sealing the photoactive layer.

**303.** (New) The photovoltaic device of claim **302**, wherein the first and second electrode layers each comprises a flexible transparent layer, and wherein the conductive portion of each of the first and second electrode layers comprises an aluminum or magnesium conductive coating on the flexible transparent layer.